# SPILLS ACTION CENTRE

# SUMMARY REPORT OF 1991 SPILLS

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# SUMMARY REPORT OF 1991 SPILLS

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Ontario Ministry of the Environment

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SPILLS ACTION CENTRE
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## EXECUTIVE SUMMARY

Environment Ontario's Spills Action Centre (SAC) receives and initiates responses to spills and other urgent environmental incidents on a 24-hour per day basis. The Centre documented 15,800 occurrence reports in 1991. Two thirds of these involved a range of Ministry notification requirements and environmental complaints from the general public. One third involved spills. The purpose of this report is to summarize information on spills reported to SAC during the calendar year of 1991. It also provides some comparisons to spill results from previous years.

The 5251 spills reported to SAC in 1991 represent about an 8% decrease from 1990. This was the first yearly decrease in reported spills since SAC began operation more than five years ago. Fewer spills to water and air accounted for this decrease while the number of spills to land remained virtually unchanged.

Almost 54% of reported spills involved oils or fuels. Chemicals or chemical solutions accounted for about 18%, wastes or wastewaters 17%, gaseous emissions 9% while other and unknown materials accounted for the remainder. A large portion of these reported spills involved small quantities: 20% were less than 10 litres, 58% were less than 100 litres and 85% were less than 1000 litres. These figures reflect a continuing trend for companies to report smaller quantity spills many of which have little or no likelihood of causing adverse effects.

About 14% of the spills had a confirmed environmental impact or adverse effect identified. Two-thirds of these involved soil contamination while the bulk of the remainder involved surface water contamination. Fifteen spills were reported to have resulted in human health and safety concerns.

Part X of the Environmental Protection Act requires that spills be cleaned up promptly and to the extent practicable. Spill cleanup information in this report shows that about 47% of all spills were completely cleaned up. An additional 17% were partially cleaned up. The majority of the remainder involved spills to air and some spills to water where cleanup was not possible.

The industrial sectors with the largest proportions of reported spills were: transportation - 15%; petroleum - 13%; chemical - 8%; and metallurgical - 8%. Generally, these values are similar to those in 1990 except for a decrease in reported chemical sector spills. Combined public sector spills, including spills from hydroelectric utilities and sewage systems, accounted for about one fifth of reported spills.

Motor vehicles were the largest source of spills accounting for more than one quarter of reported spills. Manufacturing and processing facilities from a variety of sectors, including chemical, metallurgical, pulp and paper and petroleum sectors, accounted for an additional 25%.

About 30% of the spills reported to SAC were either entirely or partially discharged to water. Of these, 288 involved oil or chemical spills to the Great Lakes System including: 103 to Lake Ontario, 64 to the St. Clair River, 54 to the St. Lawrence River, 16 to Lake Erie, 14 to Lake Superior and 13 to Lake Huron. The remainder were to the Detroit River, St. Mary's River, Georgian Bay and the Niagara River.

**How this data is used**

SAC's spill summary reports, and other information from the Ministry's Occurrence Report Information System, assist the ministry and others, such as Environment Canada and the International Joint Commission on the Great Lakes, in identifying and responding to environmental problems.

Ministry pollution abatement programs and spill reduction initiatives are developed or modified as trends or concerns are identified using this type of information. The Ministry has implemented a province-wide **Spills Prevention Strategy** requiring repeat spillers to submit spill prevention and response plans to the Ministry and to incorporate better management practices. About 30 companies currently involved in this process are submitting comprehensive work plans to address the following areas:

- Spill history review and risk assessment,
- Review of spill detection systems and implementation schedule for upgrade requirements,
- Assessment of diversion, containment and treatment systems and an implementation schedule for required upgrades,
- Emergency response plans and procedures, and
- Environmental awareness training.

## INTRODUCTION

The purpose of this report is to provide a summarized review of spills reported to Environment Ontario's Spills Action Centre (SAC) during the calendar year of 1991. It also provides some comparisons to results obtained in previous years.

Part X of Ontario's Environmental Protection Act R.S.O. 1990 ("Spills Bill") defines a spill as a discharge of a pollutant into the natural environment, where the discharge is from a container or structure and is abnormal in light of all circumstances. A spill is reportable if it causes or is likely to cause adverse effects, such as impairment to the quality of the natural environment for any use that can be made of it, injury or damage to property and animal life, harm or material discomfort or any other adverse effects listed in Section 1(1) of the Act. The onus is on the person in control of a spilled pollutant and on the person who spills, causes or permits the spill to determine the likelihood for adverse effects and to report accordingly. If adverse effects are likely, then the spill must be reported to the Ministry, the municipality, and in some situations, to the owner or person in control if they are not already aware of the spill.

The Spills Action Centre began operations on November 29, 1985, the same day that the "Spills Bill", came into force. The primary role of the Centre is to receive and initiate response to notifications of spills and other urgent environmental matters on a 24-hour per day basis. It is also responsible for the Ministry's Contingency Planning Program which promotes and reviews the development of industrial and municipal spill contingency plans. SAC's province-wide, toll-free number 1-800-268-6060 is used by industry, response agencies and the public for notifying the Ministry of spills and other urgent environmental incidents. As SAC's telephone number has become better known, it is being used increasingly for a variety of other environmental matters. In 1991, reported spills accounted for about one-third of the 15,800 occurrences reported to SAC. Non-spill occurrences involved a range of Ministry notification requirements and environmental complaints from the general public.

SAC environmental officers evaluate all reported occurrences including spills and decide upon the appropriate action to be taken. This may include any combination of the following:

- Contacting suspected pollution sources in an attempt to verify and resolve the problem;

- Contacting various agencies or potentially affected parties as needed, for example, police, fire departments, local municipal authorities, health officials, Coast Guard, US authorities, etc.;

- Contacting local Ministry of the Environment (MOE) personnel to initiate a field response when necessary;

- Notifying senior MOE management if the incident is serious, and co-ordinating information flow to the public;

- Contacting the Minister's office and conveying orders or directions from the Minister when necessary;

- Maintaining liaison with the agencies in charge of public safety in an emergency and coordinating MOE's support for their efforts;

- Providing ministry staff and others with information on chemicals and cleanup techniques, either directly or through CANUTEC, Transport Canada's national 24-hour centre;

- Recording the details of non-urgent incidents and sending them to the appropriate district office or other agencies for response during normal business hours.

Regardless of what action is initiated, all occurrences reported to SAC are recorded on a

computerized database management system called the **Occurrence Report Information System** (ORIS). This system enables the Ministry to track the status of occurrences, and facilitates data retrieval for the purpose of preparing routine summaries and performing non-routine data searches. Each occurrence report consists of a text summarizing the incident and several coded fields which facilitate data retrieval. A sample occurrence report is included in Appendix I and a listing of coding categories used for ORIS is included in Appendix II.

SAC is responsible for maintaining spill records for the entire Ministry. Spills may be reported to the Centre in one of two ways. First, they may be reported directly to SAC by the discharger or other government agencies, which accounts for the majority of spills reported. Second, they may be reported indirectly via other ministry offices. Ministry staff who receive spill reports are instructed to relay the relevant information to SAC as soon as possible to ensure staff at the Centre are aware of the incident, and to allow for prompt documentation, and the preparation of a Ministry spill summary report.

The summaries presented in this report are based on the date the occurrence was reported to SAC. The occurrence date is not always the same as the date the incident was reported. This is especially so for incidents which occur just before midnight and on occasion for those that occur near the end of a calendar year. Furthermore, the occurrence date is not used for summaries because the date of occurrence is not known for some incidents.

This report represents SAC's fourth annual summary report. The previous three reports (1988, 1989 and 1990) dealt with all occurrences reported to SAC - spills, notifications other than spills, complaints and other incidents. The 1991 summary report deals only with spills.

Initial information on spills and emergencies is often incomplete and changes as more information becomes available. Since some incidents take a long time to resolve, the information presented in this report is a "snapshot" of the information that existed in the database at the time summaries were generated. However, it is expected that any changes to the information in SAC's database will have only a minor effect on summaries presented in this report.

# SPILLS - 1991 SUMMARY

This part of the report summarizes the number and type of spills reported to SAC during 1991. Some of the data is presented with comparisons from previous years to highlight trends.

## YEARLY SPILL TOTALS AND SEASONAL FLUCTUATIONS

The total number of spills reported to SAC from 1988 to 1991 is shown in Figure 1. It shows an increase in reported spills from 4072 in 1988 to 5686 in 1990 and then a decrease to 5251 spills in 1991.

The large and increasing number of reported spills from 1988 to 1990 resulted in the Ministry implementing a **Spill Prevention Strategy** (SPS). A detailed review of reported spills was undertaken and about 35 companies which had multiple spills at any one location were initially included in this SPS program. The primary focus was on spills having adverse effects on surface or groundwater. Following a series of meetings with identified sources about 30 companies were required to submit comprehensive workplans addressing the following:

- Spill history review and risk assessment,
- Review of spill detection systems and an implementation schedule for upgrade requirements,
- Assessment of diversion, containment and treatment systems and an implementation schedule for required upgrades,
- Emergency response plans and procedures, and
- Environmental awareness training.

Figure 1

# Reported Spills - 1988 to 1991

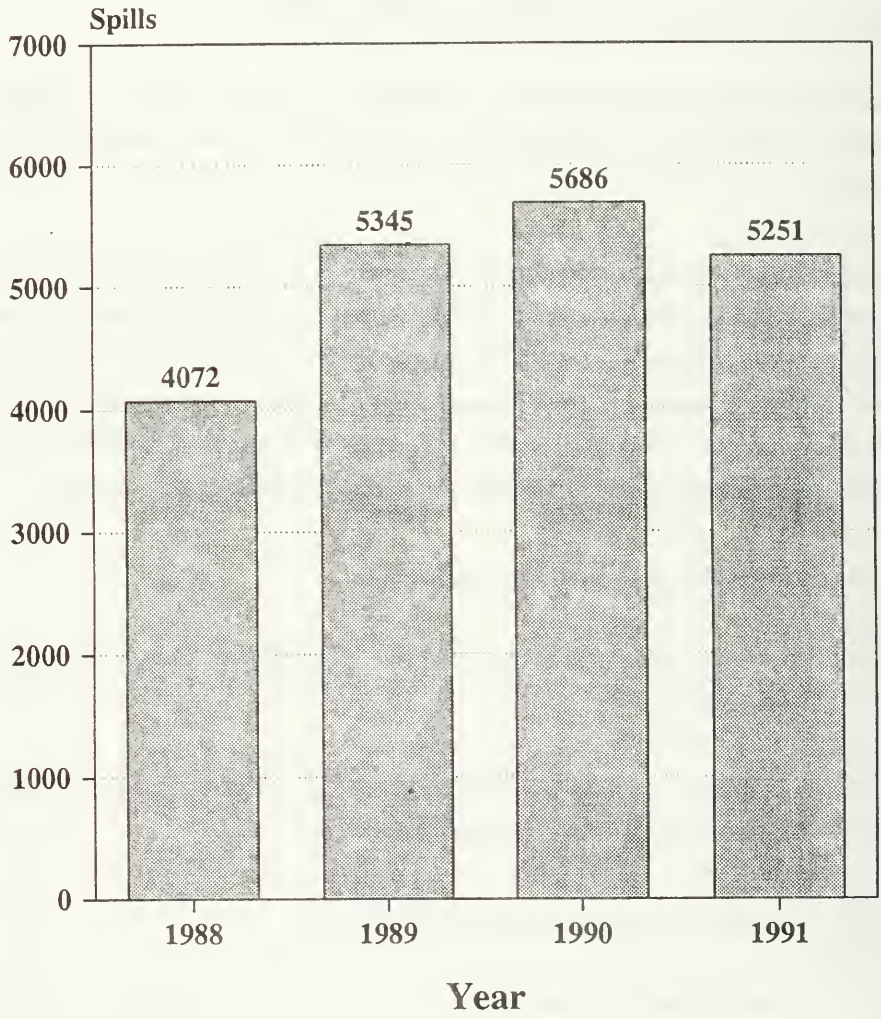
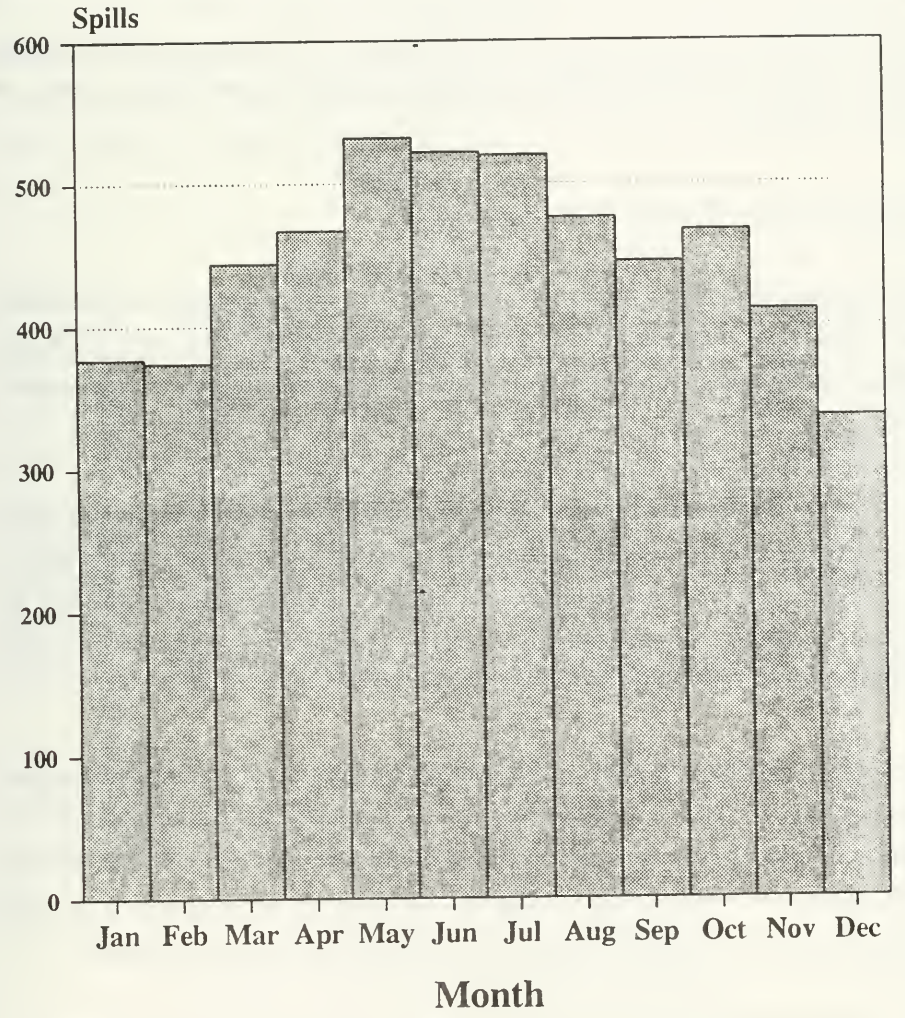


Figure 2

# Reported Spills By Month



About one third of the companies in the SPS program had finalized their workplan reports as of August 1992. The remaining two thirds are at various stages of completion and should all be finalized by April of 1993.

Seasonal fluctuations in spills reported are presented in Figure 2, which shows that SAC receives more spill reports during the warmer months than during the colder months. This may be due to a greater number of people being involved in outdoor activities during the warmer months some of which may result in accidents and spills or provide the opportunity to observe and report existing spills.

## SPILLS TO LAND, WATER AND AIR

Table 1 summarizes spills by medium (i.e. spills to air, land and water) as well as multiple media spills. It also provides comparisons to previous years. In 1991, there was a slight increase in spills to land and spills to land and water and a decrease in spills to water and spills to air.

The spills to land category, 3120 occurrences, accounted for the largest portion of all spills in 1991. These types of spills are the easiest types to manage and clean up and most spills to land are readily cleaned up with the resources of the discharger, clean-up contractors, industry spill response co-operatives, or municipalities. The topic of clean up is discussed in more detail elsewhere in the report.

There were 1054 spills to water. This number excludes all of the minor contaminant exceedences to watercourses, which are required to be reported to the Ministry as conditions of operation. These occurrences are documented as notifications other than spills and, therefore, do not appear in the spill summaries. Generally, spills to water are more difficult to manage and clean up than spills to land and require more specialized expertise and equipment.

There were 451 spills to air during the year. These were releases that due to the duration or

nature of the material involved, were perceived to have the potential to cause an adverse effect or actually did cause an adverse effect. Many sources have brief, fairly regular emissions to the atmosphere which are not classified as spills because there is no likelihood of an adverse effect or the discharges are not abnormal. These minor air discharges are documented as notifications other than spills and are not included in the spill summaries.

Multi medium spills accounted for the remaining 626 of the 5251 spills for the year. A spill to land where a portion of the spilled material entered a watercourse is coded as a spill to land and water. Likewise a few spills effect both land and air, and water and air.

**TABLE 1**

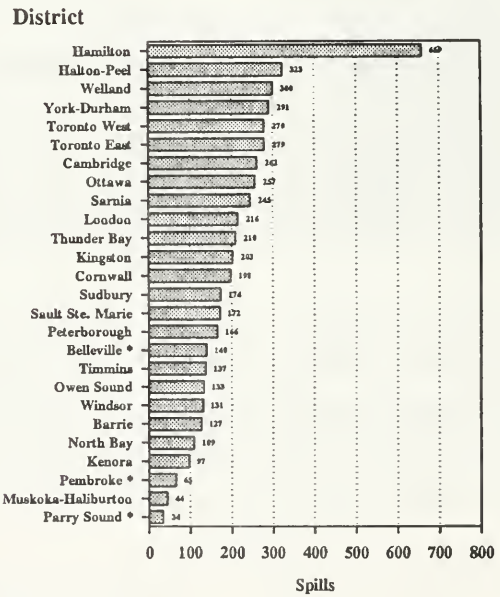
**SPILLS BY RECEIVING MEDIUM**

| SPILLS RELEASED TO | 1991 | | 1990 | | 1989 | | 1988 | |
|---|---|---|---|---|---|---|---|---|
| | SPILLS | % | SPILLS | % | SPILLS | % | SPILLS | % |
| Land | 3120 | 59.4 | 3144 | 55.3 | 2996 | 56.1 | 2261 | 55.5 |
| Water | 1054 | 20.1 | 1305 | 23.0 | 1135 | 21.2 | 969 | 23.8 |
| Air | 451 | 8.6 | 649 | 11.4 | 776 | 14.5 | 543 | 13.3 |
| Land and Water | 527 | 10.0 | 467 | 8.2 | 355 | 6.6 | 243 | 6.0 |
| Air and Land | 81 | 1.6 | 98 | 1.7 | 75 | 1.4 | 51 | 1.3 |
| Air and Water | 18 | 0.3 | 23 | 0.4 | 8 | 0.2 | 5 | 0.1 |
| Totals | 5251 | 100.0 | 5686 | 100.0 | 5345 | 100.0 | 4072 | 100.0 |

## LOCATION OF SPILLS

Figure 3 breaks down spills by Ministry District Office areas. The Ministry has 23 District Offices and 3 Sub-Offices, each responsible for a given area of the province. Generally, Districts serving large populations have to deal with more spills than those that service less populated areas. However, the presence of a few major point sources in any one District can inflate the totals for a particular office. Table 2 shows the number of spills that occurred in each upper-tier Ontario municipality in 1991. The corresponding population and geographical area statistics are also provided. In general, it can be seen that the municipalities with the largest population tend to have the greatest number of reported spills. However, due to the concentration of industrial activities, some municipalities, such as Hamilton-Wentworth and Lambton County, have a higher number of reported spills.

**Figure 3**
**Spills By MOE District**




* Sub-Offices

**TABLE 2**
**SPILLS BY MUNICIPAL AREA**

| MUNICIPALITY | SPILLS | POPULATION | AREA (km²) | MUNICIPALITY | SPILLS | POPULATION | AREA (km²) |
|---|---|---|---|---|---|---|---|
| Metropolitan Toronto | 558 | 2 275 771 | 630 | Frontenac County | 64 | 129 089 | 3 820 |
| Hamilton-Wentworth R.M. | 508 | 451 665 | 1 113 | Wellington County | 62 | 159 609 | 2 659 |
| Niagara R.M. | 302 | 393 936 | 1 851 | Northumberland County | 54 | 78 224 | 2 108 |
| Lambton County | 240 | 128 943 | 2 997 | Oxford County | 53 | 92 888 | 2 032 |
| Ottawa-Carleton R.M. | 218 | 678 147 | 2 757 | Kent County | 52 | 109 943 | 2 494 |
| Thunder Bay District | 205 | 158 810 | 109 564 | Brant County | 50 | 110 806 | 1 091 |
| Peel R.M. | 193 | 732 798 | 1 225 | Bruce County | 49 | 65 268 | 4 048 |
| Algoma District | 171 | 127 269 | 51 207 | Grey County | 48 | 84 071 | 4 505 |
| Stormont/Dundas/Glengarry County | 162 | 107 841 | 3 302 | Sudbury Distict | 47 | 26 178 | 43 275 |
| Haldimand-Norfolk R.M. | 153 | 98 707 | 2 911 | Timiskiming District | 46 | 38 983 | 12 705 |
| York R.M. | 151 | 504 981 | 1 756 | Victoria County | 42 | 63 332 | 3 067 |
| Durham R.M. | 140 | 409 070 | 2 489 | Lanark County | 40 | 54 803 | 3 064 |
| Leeds & Grenville County | 139 | 90 235 | 3 390 | Parry Sound District | 40 | 38 423 | 10 057 |
| Waterloo R.M. | 135 | 377 762 | 1 360 | Muskoka D.M. | 38 | 48 005 | 4 035 |
| Halton R.M. | 131 | 313 136 | 959 | Perth County | 35 | 69 976 | 2 190 |
| Simcoe County | 127 | 288 684 | 4 842 | Prescott & Russell County | 35 | 67 183 | 2 003 |
| Sudbury R.M. | 124 | 161 210 | 2 607 | Huron County | 35 | 59 065 | 3 402 |
| Cochrane District | 103 | 93 917 | 145 618 | Elgin County | 31 | 75 423 | 1 880 |
| Middlesex County | 97 | 372 274 | 3 361 | Rainy River District | 28 | 22 997 | 16 817 |
| Hastings County | 96 | 116 434 | 5 967 | Lennox & Addington County | 26 | 37 243 | 2 841 |
| Nipissing District | 86 | 84 723 | 18 011 | Dufferin County | 15 | 39 897 | 1 490 |
| Essex County | 83 | 327 365 | 1 862 | Prince Edward County | 15 | 23 763 | 1 048 |
| Kenora District | 73 | 58 748 | 396 871 | Manitoulin District | 9 | 11 192 | 3 679 |
| Peterborough County | 71 | 119 992 | 3 956 | Haliburton County | 6 | 14 421 | 4 169 |
| Renfrew County | 65 | 91 685 | 7 646 | TOTAL | 5 251 | 10 084 885 | 916 734 |

** - Population & Area Data from 1991 Census Information (Statistics Canada)

# TABLE 3
## SPILLS BY MATERIAL AND REGION

| MATERIAL GROUP | | MOE REGION | | | | | | TOTAL |
|---|---|---|---|---|---|---|---|---|
| | | SW | WC | C | SE | NE | NW | |
| OILS | Crude | 6 | 1 | 5 | 1 | 0 | 0 | 13 |
| | Gasoline/Jet Fuel | 72 | 92 | 256 | 129 | 62 | 37 | 648 |
| | Light Petroleum Oils | 281 | 354 | 637 | 388 | 229 | 122 | 2011 |
| | Heavy Petroleum Oils | 19 | 55 | 42 | 11 | 16 | 6 | 149 |
| | Other Petroleums | 27 | 29 | 38 | 13 | 10 | 3 | 120 |
| | Non-Petroleum Oils | 1 | 9 | 7 | 1 | 0 | 1 | 19 |
| | SUB-TOTAL | 406 | 540 | 985 | 543 | 317 | 169 | 2960 |
| CHEMICALS | Acids | 17 | 35 | 26 | 49 | 20 | 11 | 158 |
| | Bases | 6 | 9 | 5 | 17 | 4 | 4 | 45 |
| | Halogenated Solvents | 3 | 4 | 8 | 3 | 1 | 0 | 19 |
| | Non-Halogenated Solvents | 29 | 20 | 43 | 9 | 5 | 2 | 108 |
| | Pesticides | 7 | 11 | 15 | 7 | 7 | 3 | 50 |
| | PCB's | 19 | 19 | 37 | 19 | 3 | 0 | 97 |
| | Other Organic Chemicals | 33 | 60 | 81 | 38 | 20 | 13 | 245 |
| | Other Inorganic Chemicals | 60 | 62 | 46 | 57 | 26 | 17 | 268 |
| | SUB-TOTAL | 174 | 220 | 261 | 199 | 86 | 50 | 990 |
| GASES | Smoke | 12 | 93 | 28 | 7 | 6 | 1 | 147 |
| | Dust/Particulate | 7 | 32 | 13 | 2 | 7 | 0 | 61 |
| | Nitrous Oxides | 1 | 0 | 1 | 5 | 0 | 0 | 7 |
| | Sulphurous Oxides | 1 | 1 | 1 | 1 | 7 | 0 | 11 |
| | Natural Gas (Methane) | 3 | 2 | 6 | 0 | 0 | 0 | 11 |
| | Other Gases | 66 | 73 | 46 | 20 | 23 | 10 | 238 |
| | SUB-TOTAL | 90 | 201 | 95 | 35 | 43 | 11 | 475 |
| WASTES | Liquid Industrial | 17 | 137 | 44 | 25 | 96 | 33 | 352 |
| | Hazardous Solid | 2 | 5 | 2 | 0 | 3 | 1 | 13 |
| | Non-Hazardous Solid | 2 | 19 | 17 | 11 | 12 | 1 | 62 |
| | Sewage | 23 | 41 | 68 | 46 | 60 | 32 | 270 |
| | Agricultural Wastes | 17 | 4 | 2 | 4 | 1 | 0 | 28 |
| | Other Wastes | 20 | 81 | 55 | 19 | 29 | 16 | 220 |
| | SUB-TOTAL | 81 | 287 | 188 | 105 | 201 | 83 | 945 |
| OTHERS | Feed & Foodstuff | 6 | 6 | 14 | 2 | 1 | 4 | 33 |
| | Unknown | 5 | 5 | 14 | 5 | 3 | 0 | 32 |
| | Other Materials | 4 | 29 | 6 | 4 | 11 | 6 | 60 |
| | SUB-TOTAL | 15 | 40 | 34 | 11 | 15 | 10 | 125 |
| TOTALS | | 766 | 1288 | 1563 | 893 | 662 | 323 | 5495 |

## TYPES OF MATERIALS SPILLED

Table 3 is a tabulation of spills by material type and Ministry of the Environment Regions (Southwestern, West Central, Central, Southeastern, Northeastern and Northwestern). A number of spill occurrences involved more than one spilled material. Therefore, the total number of materials spilled (5495) exceeds the total number of reported spill occurrences (5251).

Oils, including gasoline, fuel oils, and light petroleum oils, accounted for 53.9% (2960) of all reported spilled materials. Many of these are operating fuels which were discharged as a result of transportation accidents or fuel leaks from fixed storage facilities. The Ministry's Central Region had the largest number of reported oil spills.

Chemicals, including chemical solutions, comprised the second largest category of spilled materials. These substances are often referred to as environmentally hazardous materials. This category has been divided further into various sub-categories. The two largest sub-categories of "other organic" and "other inorganic" accounted for just over half of all chemical spills and 9.3% of all materials spilled. Spills involving Polychlorinated Biphenyls (PCB's) in concentrations greater than 50 parts per million accounted for 9.7% of chemical spills and 1.8% of all materials spilled. Central Region had the largest number of reported chemical spills followed by West Central, Southeastern, and Southwestern.

Wastes accounted for the third largest category in Table 3, representing 17.2% of all materials spilled. These are materials that were considered wastes prior to the spill occurrence. They may have originated as byproducts of industrial processes and may involve abnormally high concentrations of pollutants in otherwise normal wastewater discharges. The largest number of spills in this category occurred in the Ministry's West Central and Northeastern Regions.

Gaseous spills accounted for 8.6% of the reported spills. Many of these occurred in West Central Region and are attributed to steel making operations in the Hamilton area.

## TABLE 4
## FOUR YEAR COMPARISON OF SPILLS BY MATERIAL

| MATERIAL GROUP | YEAR | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1991 | | 1990 | | 1989 | | 1988 | |
| | SPILLS | % | SPILLS | % | SPILLS | % | SPILLS | % |
| Oils | 2960 | 53.9 | 3144 | 52.4 | 2831 | 49.8 | 2136 | 50.8 |
| Chemicals | 990 | 18.0 | 1031 | 17.3 | 1118 | 19.6 | 798 | 19.0 |
| Gases | 475 | 8.6 | 717 | 12.0 | 864 | 15.2 | 546 | 13.0 |
| Wastes | 945 | 17.2 | 1032 | 17.2 | 763 | 13.4 | 602 | 14.3 |
| Unknown | 32 | 0.6 | 37 | 0.6 | 81 | 1.4 | 96 | 2.3 |
| Other | 93 | 1.7 | 30 | 0.5 | 32 | 0.6 | 24 | 0.6 |
| Totals | 5495 | 100.0 | 5991 | 100.0 | 5689 | 100.0 | 4202 | 100.0 |

Table 4 provides a four year comparison of spills by material group. The relative percentages of each major material category are shown along with the actual number of materials spilled. The results show a significant decline in the number of gaseous spills since 1989.

## SPILL VOLUMES

Spill quantity information in this report is presented by sorting the volumes of the material categories oils, chemicals and wastes into the quantity groups shown in Figure 6. Spills of solids have been included where applicable by converting kilograms to litres.

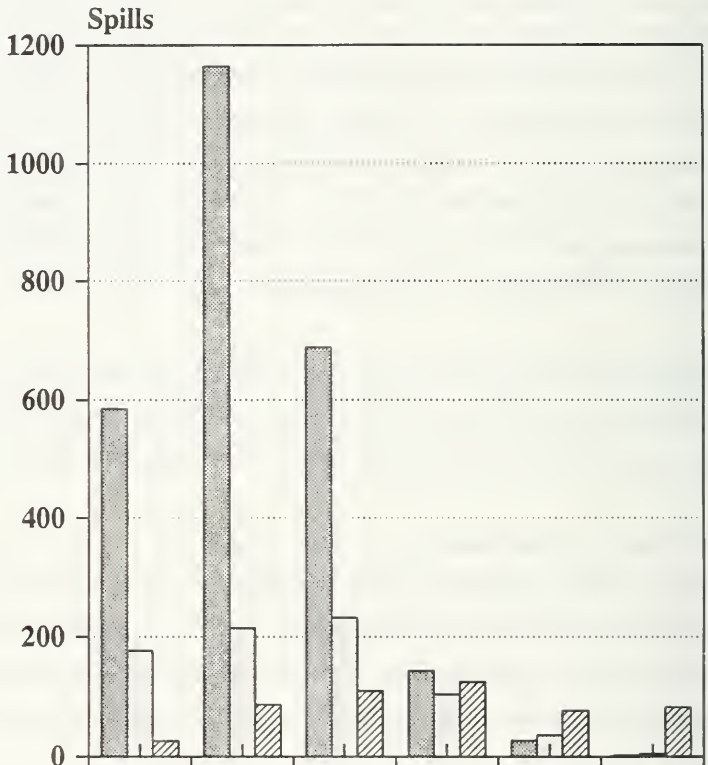
From Figure 4, it is evident that a large proportion of spills reported to SAC involved oils and many of these were relatively small quantities. The data points (the number of spills in each quantity group) at the base of the graph can be used to show that 585 (22% of the oil spills) were less than 10 litres, cumulatively 1749 (67%) were less than 100 litres and 2438 (93%) were less than 1000 litres (about the size of a home heating fuel tank). These figures are indicative of a continuing trend by industry and others to report more small volume spills which may not have been considered reportable several years ago.

About 23% of the chemical spills with known volumes were less than 10 litres, cumulatively 51% less than 100 litres and 81% were less than 1000 litres. Spills of chemicals are often of larger volume than spills involving oils because the contaminant of concern is in a solution.

Spills of wastes and wastewaters consist most of the time of very large proportions of water in comparison to the concentration of contaminants in the waste or wastewater. There were only a few small quantity waste and wastewater spills reported. In comparison to the volumes of oil and chemical spills, most spills in the waste or wastewater category, although few in number, were relatively large in volume. About 56% of the waste spills were greater than 1000 litres.

The combined oil, chemical and waste spill volume data in Figure 4 can be used to show that 20% of all spills were less than 10 litres, 58% less than 100 litres and 85% less than 1000 litres.

# Figure 4
# Spill Volumes
# By Material Type




| | 0 to 10 Litres | 10 to 100 | 100 to 1 000 | 1 000 to 10 000 | 10 000 to 100 000 | > 100 000 |
|---|---|---|---|---|---|---|
| Oils | 585 | 1164 | 689 | 144 | 27 | 2 |
| Chemicals | 177 | 215 | 232 | 104 | 36 | 5 |
| Wastes | 26 | 87 | 110 | 125 | 77 | 83 |

Volume was known for **3888 (79 %)**
of the Spills involving these materials

## ENVIRONMENTAL IMPACT

The spills summarized in this report involve a wide range of materials, quantities, and circumstances, all of which can contribute to the effect of the spill on the environment. In order to provide some measure of the seriousness of a spill, the occurrence report form contains a field for documenting the likelihood of an environmental impact of the spill at the time it was reported, as well as a field which describes the nature of possible or confirmed impacts. The likelihood of impact and nature of "confirmed" impacts are illustrated in Figure 5.

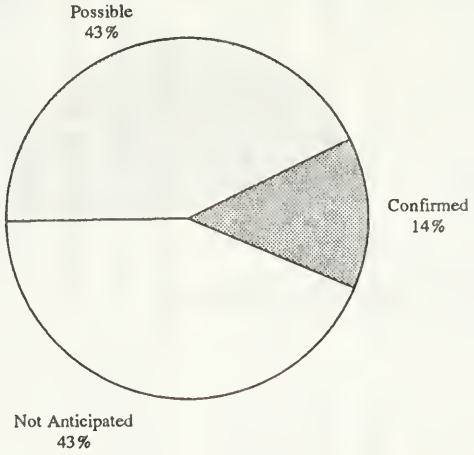
Adverse environmental impacts were confirmed for 14% (711 of 5251) of the spills, as shown in Figure 5. A further 43% (2257) of the spills were recorded as having a potential impact or adverse effect. A similar number of spills (2283 or 43%) were considered not to have any adverse environmental impact within the impact concepts represented by the coding fields identified in Appendix II. Confirmation of impact is frequently not a good indicator of the extent of the impact. For example, a spill which has a confirmed soil contamination impact may involve the removal of a few shovels of contaminated soil or it may involve the removal of several hundred cubic meters of contaminated soil. The interpretation of environmental impact needs to be made of each incident in conjunction with the volume and type of substance spilled, location, time of year and other environmental factors. There is no factoring available that can be used to add up a cumulative environmental impact for all incidents which can be presented as a summary. Individual impacts cannot be added up to a cumulative environmental impact that can be presented in a summary.

Figure 5 also illustrates that for spills with a confirmed environmental impact, two-thirds involved soil contamination and less than one-fifth involved surface water contamination. The incidents which refer to impact on wild life were spills that resulted in confirmed fish kills.

Fifteen spills were reported to have resulted in human health and safety concerns.

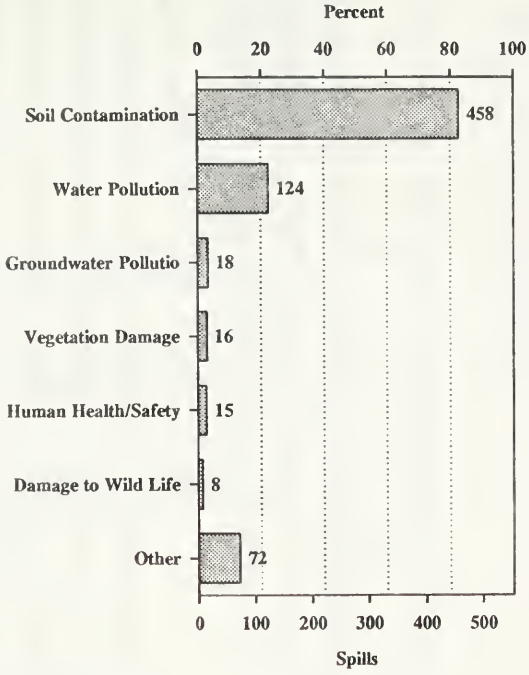
# Figure 5

## Environmental Impact




5251 Spills were
Reported to SAC in 1991

## Nature of Confirmed Impact




Total Spills Where Environmental
Impact Confirmed: 711

## SPILL CLEANUP

Part X of the Environmental Protection Act requires that spills be cleaned up promptly and to the extent practicable. It places the primary cleanup responsibility on the discharger, that is the person who owned as well as the person who had control of the pollutant immediately prior to the spill. For the most part, spills are cleaned up directly by those responsible or indirectly by their contractors or industrial spill cleanup cooperatives. Municipalities provide cleanup response on an as required basis. The success of cleanup efforts is often related to the terrain and access to the spill site, soil conditions, types of water bodies involved, the quantity and nature of the material(s), weather and light conditions, availability of expertise and resources, and the time required to mobilize a response. Spills to land have a much higher cleanup success rate than do spills to surface waters and releases of gaseous substances to atmosphere are normally impossible to clean up.

The Ministry tracks the status of spill cleanup success with ORIS. In 1991, cleanup data was available for 5009 spills out of the total of 5251. The results for these 5009 spills are shown in Table 5 below. The bulk of the 1828 spills with zero% cleanup were spills to air or spills to water where cleanup was not practicable.

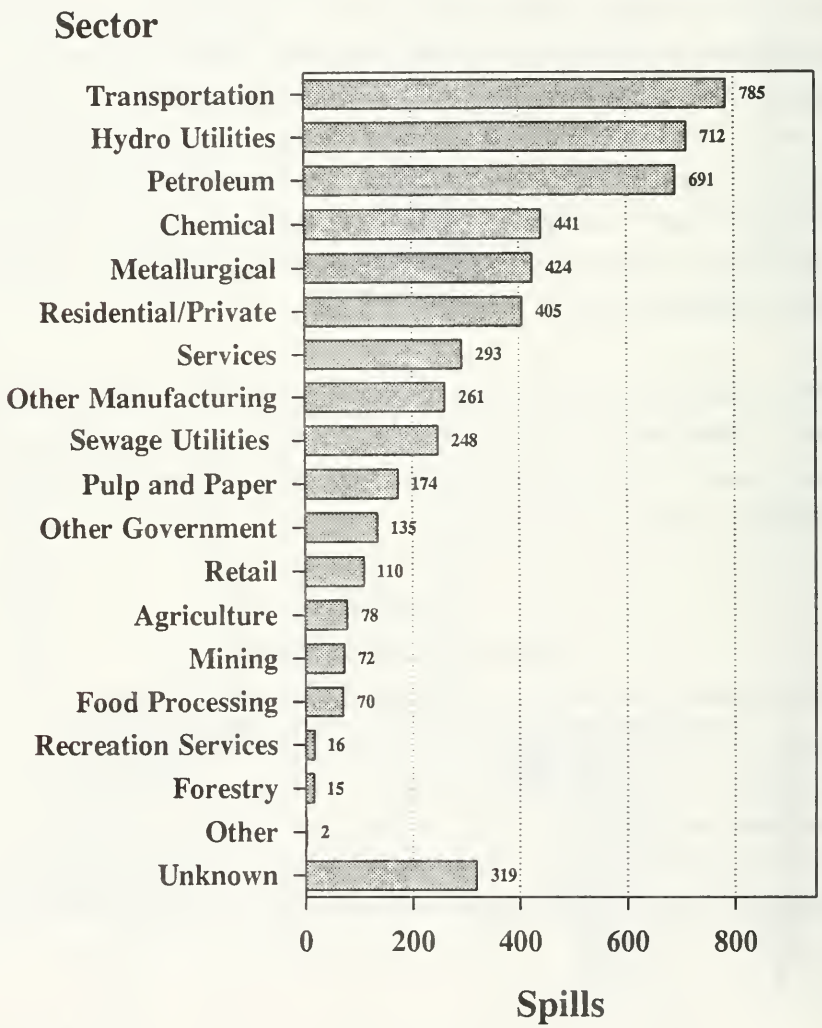
**TABLE 5**

**SPILL CLEANUP RESULTS**

| Cleanup Percentage | Number of Spills |
|---|---|
| 0 (No cleanup) | 1828 (36%) |
| 1 - 50 | 128 (3%) |
| 51 - 90 | 676 (14%) |
| 91 - 100 (Complete cleanup) | 2377 (47%) |

Figure 6

# Spills By Sector




Reported Spills: 5251

## SPILLS BY SECTOR

Figure 6 summarizes spills by the various industrial and service sectors. The industrial sectors with the largest numbers of reported spills were transportation, petroleum, chemical, and metallurgical. Collectively, spills from these four sectors accounted for close to half of all spills reported to SAC. These 1991 results are compared to the previous three years in Table 6. The largest numbers of non-industrial sector spills were attributed to hydro utilities, residential/private and sewage systems.

There were 785 spills attributed to the **transportation sector.** This sector includes companies and carriers whose only business is the transportation of materials or people. It does not include the private transportation services operated by other industries such as the petroleum, chemical, or pulp & paper industries. (The total number of spills involving all transportation activities from all sectors was 1514. This is dealt with on page 23.)

The **petroleum sector** includes all services operated by the petroleum industry, including refineries, storage depots, tank trucks and service stations. Combined, there were 691 spills from all operations within this sector. The majority (71%) of the spills in this sector occurred from fixed facilities such as service stations, storage depots, bulk stations and refineries. The bulk of the remainder (28%) were from tank trucks, and these include cargo as well as operating fuels and other operating liquids.

The **metallurgical sector** includes facilities involved in the manufacturing of primary metals. Most of the 424 spills in the metallurgical sector occurred at 5 facilities located in Hamilton, Nanticoke, Sudbury and Sault Ste. Marie.

The **chemical sector** applies to chemical process facilities that produce basic chemicals or feed stocks and includes chemical company transport vehicles. The number of reported spills from this sector decreased by 28 percent from the previous year. Almost one third of the 441 chemical sector spills occurring in 1991 occurred at 3 facilities which are located in Maitland

Township, Cornwall and Hamilton. One fifth of the chemical sector spills occurred in the Sarnia area.

TABLE 6
YEARLY COMPARISON OF HIGHEST RANKED INDUSTRIAL SECTORS

| INDUSTRIAL SECTORS | YEAR | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1991 | | 1990 | | 1989 | | 1988 | |
| | SPILLS | % | SPILLS | % | SPILLS | % | SPILLS | % |
| Transportation | 785 | 14.9 | 834 | 14.7 | 715 | 13.4 | 473 | 11.6 |
| Petroleum | 691 | 13.2 | 712 | 12.5 | 709 | 13.3 | 547 | 13.4 |
| Metallurgical | 424 | 8.1 | 476 | 8.4 | 502 | 9.4 | 424 | 10.4 |
| Chemical | 441 | 8.4 | 615 | 10.8 | 585 | 10.9 | 416 | 10.2 |
| Totals | 2341 | 44.6 | 2637 | 46.4 | 2511 | 47.0 | 1860 | 45.6 |

The 712 **hydro utility** spills shown in Figure 7 involved discharges of insulating oils from capacitors and transformers in Ontario's vast electrical distribution system. Some are the direct result of traffic accidents or electrical storms in which ground level or pole mounted transformers were ruptured. Ontario Hydro and local municipal utilities are responsible for maintaining their respective portions of Ontario's electrical network and for cleaning up these spills when they occur. The hydro utility category also includes spills from Ontario power generating plants. Generally, these spills involved hydraulic fluids, lubricating oils or abnormal discharges of smoke.

The 405 spills categorized as being from the **residential or private** owner spills primarily involved discharges of operating fluids from privately owned motor vehicles and discharges from home heating fuel storage tanks.

Ontario has approximately 420 sewage treatments plants and numerous sewage pumping stations. About 60% of the plants are run by the Province while the remainder are operated by the municipalities they serve. There were 248 spills from **provincial and municipal sewage treatment systems**. These involved abnormal or accidental discharges of sewage.

## SOURCES OF SPILLED MATERIALS

Figure 7 summarizes spills by several specified source categories. Spills from motor vehicles is the largest source category accounting for 1365 spills or 26% of all spills reported. This category covers all types of road vehicles, including transport trucks, tank trucks and automobiles. Spills from these sources are often of operating fluids (gasoline, motor oil, hydraulic oil) and also include cargo carried by the vehicles such as petroleum products, chemicals and waste materials. As mentioned in the section dealing with spills by sector, there were a total of 1514 spills involving all transportation modes. The 149 transportation-related spills that were not from motor vehicles consisted of 77 spills from ships and boats, 59 involving trains, and 13 involving aircraft. In total, transportation-related sources accounted for 29% of all spills.

There were 1307 spills from manufacturing and processing facilities. Of this group, 31% of these spills occurred at chemical facilities, 29% at metallurgical facilities, 16% at general manufacturing plants, 12% at pulp & paper plants, 6% at petroleum sector facilities, and 6% occurred at facilities operated by various other sectors.

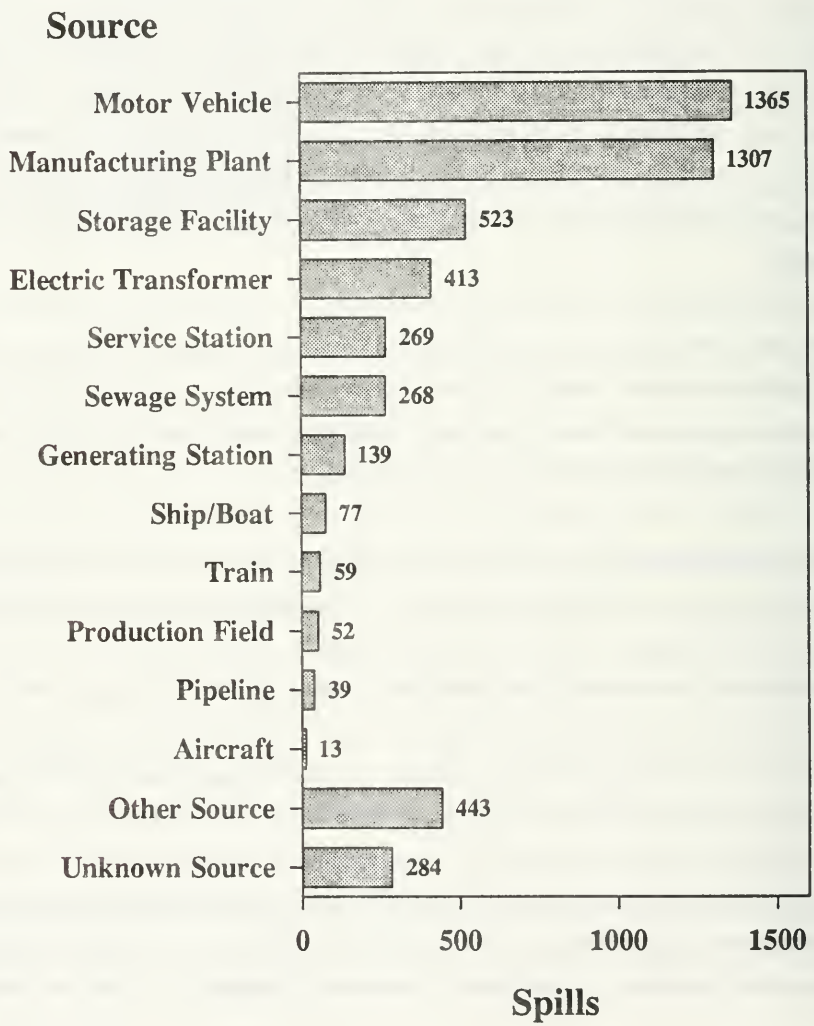
The storage facility category includes both private and commercial sites at which materials are stored for on-site use or distribution to other sites. This category includes sources ranging from small residential furnace oil tanks and large petroleum storage depots. In total, 523 spills occurred at these sites which represents about 10% of all spills reported during 1991.

Spills from electrical transformers accounted for 413 occurrences. These occurrences typically consisted of amounts of less than 100 litres of oil spilled as a result of transformer failure.

There were 269 spills at service stations during 1991. This category includes all types of vehicle servicing facilities, gas stations, as well as marinas. Spills at these sites typically involve leaks of petroleum products from storage tanks, fuel draining from hoses, and overflows which occur

Figure 7

# Spills By Source




Reported Spills: 5251

while vehicle tanks are being filled.

The next largest source category reported were 268 spills from sewage systems, including septic tanks, sanitary sewers, pumping stations and the water pollution control plants (WPCP). Such discharges often occur when septic tanks overflow or when equipment at the WPCP fails. Often, however, heavy rains or increased flows from spring run-off overload sewage systems, resulting in a bypass of sewage to the receiving watercourse. Bypasses, when caused by rain or runoff are exempt from Part X of the EPA and, as such, are not considered spills.

The generating station category includes all types of heat and power generating facilities, many of which are operated by Ontario Hydro. The 139 spills which occurred at these sites in 1991 typically involved spills of lubricating oil or significant releases of smoke and other gases to the atmosphere.

There were 52 spills in the production field category, which covers spills of raw materials at the point of extraction. Spills of oil from wells or drilling rigs, for example, fall within this category as do spills at or from mines or gravel pits.

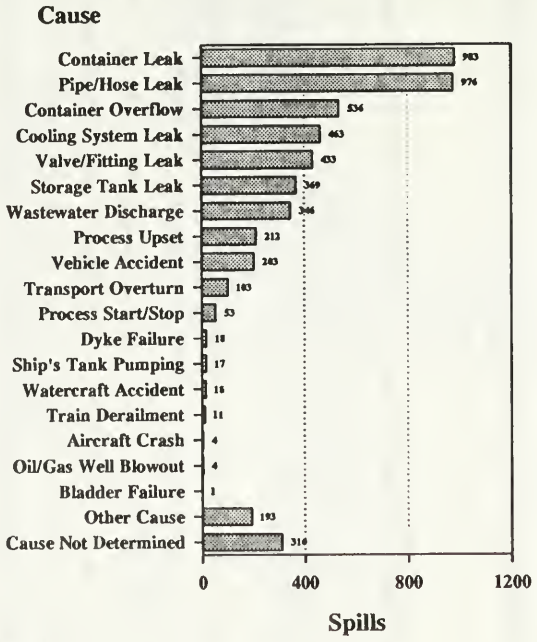
The pipeline category is used for spills of materials from bulk distribution systems or pipeline systems and does not include discharges from small in-plant piping systems. Oil and natural gas pipelines are in this category. There were 39 spills.

The other source category covers discharges from all other types of sources not listed above. Discharges from these various sources accounted for 443 spills.

In some cases, the Ministry is unable to determine the source of a spill. Typically, these occurrences involve spills to roads, ditches or watercourses where the source of the material cannot be found. Some of these occurrences involve the illegal dumping of materials. In 1991, 284 spills occurred where the Ministry could not determine the source.

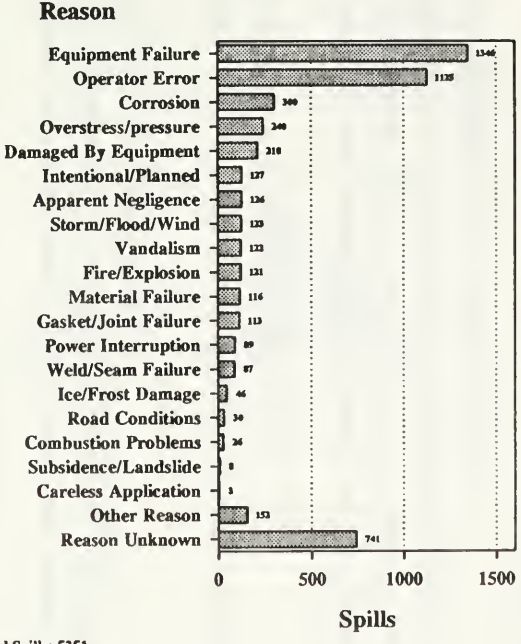
# Figure 8

## Spills By Cause




Reported Spills: 5251

## Spills By Reason




Reported Spills: 5251

## CAUSE AND REASON

Each spill is given a cause and a reason code to indicate the factors reportedly or most likely contributing to the discharge. "Cause" refers to how a spill occurred and "reason" attempts to clarify the cause by identifying the primary contributing factor. For example, a spill may be caused by a transportation accident and the reason for the accident may be adverse road conditions.

Figures 8 summarizes the various cause and reason categories attributed to spills in 1991. Container leaks, pipe and hose leaks and container overflows caused nearly half of all spills. Equipment failure and operator error were the major reasons for spills. These values are consistent with those presented in previous years.

Cause and reason codes are used together to provide more meaningful information in Appendix III. Since space does not enable the full descriptions of each code to be shown on the table, the numeric codes have been used instead. These codes are defined in Appendix II and an abbreviated version of the definitions is located in Appendix III.

Appendix III reveals that only 15 combinations of cause and reason code combinations, out of a possible 506, account for nearly half of all reported spills (2352 spills out of 5251). These combinations are summarized in Table 7. There were 285 spills for which neither cause nor reason were known or could be determined.

## Table 7

### Major Combinations of Causes and Reasons for Spills

| CAUSE | REASON | SPILLS |
|---|---|---|
| Pipe/Hose Leak | Equipment Failure | 350 |
| Container Overflow | Error | 250 |
| Valve/Fitting Leak/Failure | Equipment Failure | 217 |
| Pipe/Hose Leak | Error | 177 |
| Container Leak | Equipment Failure | 168 |
| Cooling System Leak | Equipment Failure | 158 |
| Container Leak | Unknown | 152 |
| Transport Accident | Error | 137 |
| Container Overflow | Equipment Failure | 135 |
| Pipe/Hose Leak | Overstress/Overpressure | 124 |
| Wastewater Discharge/Bypass | Equipment Failure | 123 |
| Process Upset | Equipment Failure | 96 |
| Underground Tank Leak | Corrosion | 94 |
| Container Leak | Damage By Moving Equipment | 88 |
| Valve/Fitting Leak/Failure | Error | 83 |
| TOTAL | | 2352 |

Note: There is some room for overlap with these codes. Often, the occurrence receives the coding combination that is the "best-fit", even though a similar combination might also be appropriate.

## SPILLS TO THE GREAT LAKES AND THEIR INTERCONNECTING CHANNELS

This section of the report focuses on oils and chemicals which spilled directly to the waters of the Great Lakes System. The importance of the Great Lakes cannot be overstated. They contain about 20% of all of the world's fresh water. While it is presumed that spills constitute a very small fraction of total pollution loading to the Great Lakes, the immediate impact of some spills can have a significant local impact.

Oil and chemical spills which occurred during 1991 were analyzed closely to identify those which were spilled to the Great Lakes and the interconnecting channels. Spills from shore facilities, spills associated with the marine transportation mode which occurred on or to the waters of the Great Lakes system, and spills to sewers or drains which discharged directly to the waterbodies were included in this group. In total, there were 288 spill incidents of oils and chemicals to the Great Lakes system during 1991 from a variety of sectors. These are summarized in Table 8. This total represents a reduction of 45 spills from the total number of oil or chemical spills to the Great Lakes which occurred during 1990.

Some of the spill incidents involved more than one material released during the occurrence. Table 9 summarizes the total number materials spilled in the oils and chemicals groupings.

Figure 9 reflects the number of oil and chemical spills to the Great Lakes in volume groups similar to those reported in Figure 4 of the report. About 63% of these spills were in quantities of less than 1000 litres. Similar observations were made in previous years. This is a further indication that the majority of spills reported involved relatively small quantities.

As was already indicated in the report, spills are most difficult to deal with when they impact open waterbodies. Currents encountered in the interconnecting channels of the Great Lakes make cleanup even more difficult. Spills of chemicals add another level of difficulty to cleanup efforts, and spills of soluble chemicals, chemical suspensions, or solutions are essentially

## TABLE 8

## OIL AND CHEMICAL SPILLS TO THE GREAT LAKES - SECTOR SUMMARY

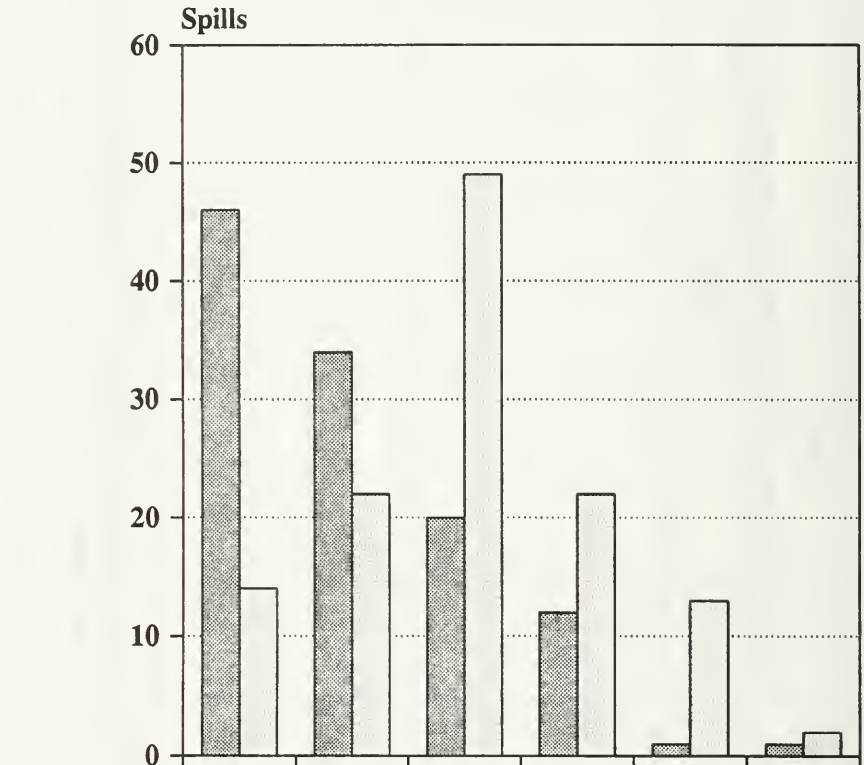
| SECTOR | WATERBODY | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | LAKE SUPERIOR | ST. MARYS RIVER | GEORGIAN BAY | LAKE HURON | ST.CLAIR RIVER | DETROIT RIVER | LAKE ERIE | NIAGARA RIVER | LAKE ONTARIO | ST. LAWRENCE RIVER | TOTAL |
| Chemical | | | | | 24 | 5 | 1 | | 3 | 42 | 75 |
| Food Processing | | | | | | 1 | | | 1 | | 2 |
| Hydro Utilities | | | | 8 | 4 | | 7 | 3 | 15 | | 37 |
| Other Government | | | | 1 | 1 | | 0 | | 3 | | 5 |
| General Manufacturing | | | | | 1 | 1 | 1 | | 3 | | 6 |
| Metallurgy | | 3 | | | | | | | 34 | | 37 |
| Mining | | | | 1 | | | | | | | 1 |
| Petroleum | | | | | 17 | | 3 | | 6 | | 26 |
| Pulp & Paper | 11 | 2 | | | | | | | | 7 | 20 |
| Recreational | | | | | | | | | 3 | | 3 |
| Residential/Private | | | 2 | 3 | 2 | | 1 | | 5 | 3 | 16 |
| Retail | | | 1 | | | | | | | | 1 |
| Service Industry | | | | | | | | | 3 | 1 | 4 |
| Transportation | 3 | 1 | 2 | | 12 | 1 | 2 | | 13 | 1 | 35 |
| Other | | | | | | | 1 | | | | 1 |
| Unknown | | | | | 3 | 2 | | | 14 | | 19 |
| Total | 14 | 6 | 5 | 13 | 64 | 10 | 16 | 3 | 103 | 54 | 288 |

## TABLE 9

## OIL AND CHEMICAL SPILLS TO THE GREAT LAKES - MATERIAL SUMMARY

| MATERIAL GROUP | | WATERBODY | | | | | | | | | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | LAKE SUPERIOR | ST. MARYS RIVER | GEORGIAN BAY | LAKE HURON | ST. CLAIR RIVER | DETROIT RIVER | LAKE ERIE | NIAGARA RIVER | LAKE ONTARIO | ST. LAWRENCE RIVER | |
| OILS | Crude | | | | | 1 | | | | | | 1 |
| | Gasoline/Jet Fuel | | | 3 | 3 | 3 | | | | 8 | 2 | 19 |
| | Light Petroleum Oils | 2 | 1 | 3 | 6 | 12 | 2 | 7 | 2 | 45 | 3 | 83 |
| | Hesvy Petroleum Oils | 2 | | | 5 | 5 | 1 | 4 | 1 | 13 | | 31 |
| | Other Petroleum Oils | 1 | | | | 8 | 2 | 1 | | 15 | | 27 |
| | Non-Petroleum Oils | | | | | | | | | | | |
| | SUB-TOTAL | 5 | 1 | 6 | 14 | 29 | 5 | 12 | 3 | 81 | 5 | 161 |
| CHEMICALS | Acids | 2 | | | 1 | 1 | | 1 | | 3 | 32 | 40 |
| | Bases | 3 | | | | 3 | | | | 1 | 4 | 11 |
| | Halogenated Solvents | | | | | 1 | | | | | | 1 |
| | Non-Halogenated Solvents | 1 | 1 | | | 10 | 1 | | | 1 | | 14 |
| | Pesticides | | | | | | | | | | 1 | 1 |
| | Other Organic | 3 | 3 | | 1 | 8 | | 2 | | 6 | 3 | 26 |
| | Other Inorganic | 1 | 1 | | | 15 | 4 | 2 | | 15 | 9 | 47 |
| | SUB-TOTAL | 10 | 5 | | 2 | 38 | 5 | 5 | | 26 | 49 | 140 |
| TOTAL | | 15 | 6 | 6 | 16 | 67 | 10 | 17 | 3 | 107 | 54 | 301 |

## Figure 9
## Great Lakes Spill Volumes By Material Type




| | 0 to 10 Litres | 10 to 100 | 100 to 1 000 | 1 000 to 10 000 | 10 000 to 100 000 | > 100 000 |
|---|---|---|---|---|---|---|
| Oils | 46 | 34 | 20 | 12 | 1 | 1 |
| Chemicals | 14 | 22 | 49 | 22 | 13 | 2 |

Volume was known for 236 of 292 (81%)
Spills to the Great Lakes System
Involving Oils and Chemicals

impossible to clean up. These generalities are supported by Table 10 which summarizes information on cleanup achieved for oil and chemical spills to the Great Lakes for which clean up information was available. Cleanup details were known for 274 of the 288 spills to the Great Lakes system.

**TABLE 10**

**GREAT LAKES SPILL CLEANUP**

| CLEANUP PERCENTAGE | MATERIAL TYPE | |
|---|---|---|
| | OILS | CHEMICALS |
| 0% | 70 | 119 |
| < 50% | 23 | 7 |
| 51 - 90 % | 24 | 6 |
| 91 - 100 % | 21 | 4 |
| TOTAL | 138 | 136 |

# APPENDIX I

# SAMPLE OCCURRENCE REPORT

# OCCURRENCE REPORT

| Received By | Region No. | S.A.C. No. | I.E.B. No. |
|---|---|---|---|
| BUD TOWER | - | - | |

Occurrence Type: SPILL
Subtype: LAND
Action Class: 1:[25] 2:[12] 3:[ ]

| | Date | Time (24 hr) |
|---|---|---|
| Occurrence: | 91/01/01 | 12:00 |
| Report to SAC: | 91/01/01 | 12:30 |
| Report to MOE: | 91/01/01 | 12:30 |
| MOE at Scene: | 91/01/01 | 13:30 |

Environmental Officer Assigned:

Reported by (Name/Organization)
HAL SMITH
POLICE DEPARTMENT
Tel. No.: 705-555-1212 EXT.:
Alt. No.: - - EXT.:
Address:
399 MAIN STREET
SUDBURY
Postal Code: P3A 1T2

Location of Occurrence:
Region..: 5 NORTHEAST
District: SD SUDBURY
Municipality: 23101
SUDBURY CITY
999 MINESHAFT ROAD

Source:
PRIVATE OWNER
MOTOR VEHICLE

Source: [MV] Sector: [RS] SIC: [9741]
UTM:
N: [5148000] E: [ 500000] Zone: [17]

Syn:PRIVATE AUTOMOBILE: 5 LITRES GASOLINE SPILLEDTO GROUND DUE TO ACCIDENT

Brief Summary:
5 LITRES OF GASOLINE SPILLED TO THE DITCH WHEN A PRIVATELY OWNED MOTOR VEHICLE WAS STRUCK BY ANOTHER CAR.
THE WORKS DEPARTMENT RESPONDED AND CLEANED UP THE SPILLED FUEL WITH SAND, WHICH THEY WILL DISPOSE OF AT THE WASTE DISPOSAL SITE.
MOE ABATEMENT OFFICER CHECKED THE SITE AND CONFIRMED THE CLEAN UP WAS COMPLETE.

If there are related reports, list them in the summary preceeded by 'RELATED'.

Follow-up Action: [X] Abatement [ ] IEB [ ] OTHER
SITE VISIT - CLEAN UP COMPLETE.

Suspected Violation Code: [ ]

File Closed: [ ] Abatement [ ] IEB [ ] OTHER

IEB Investigator Assigned

| Report Prepared by: | Date | BF Date | Person-Days | MBR | Function |
|---|---|---|---|---|---|
| | | | | | |

| Approving Officer | Date | Reviewing Officer | Date |
|---|---|---|---|
| | | | |

List numbers showing: A - routing of the original, B - distribution of copies.
A: [ ] [ ] [ ] [ ] [ ]
B: [ ] [ ] [ ] [ ] [ ] [ ]

1. Investigator/ERP
2. Distr.officer/file
3. SAC
4. Reg.Dir or Mgr
5. IEB Reg. Super.
6. IEB H.O./file
7. Other _____

Region No.: - S.A.C. No.: - IEB No.:

---

Material 1: GASOLINE — Code..: 12
Amount: 5 L — UN No.: 1203
Material 2: — Code..:
Amount: — UN No.:
Material 3: — Code..:
Amount: — UN No.:

---

Cause.....: OTHER TRANSPORTATION ACCIDENT — Code..: 08
Reason.....: ERROR — Code..: 02

Contact: [N] ERP Name: Date:
Callout: [ ] SAC Operator: Time: :

Controller of Material: PRIVATE OWNER — Code..: N/A
Owner of Material.....: PRIVATE OWNER — Code..: N/A
Agencies Involved.....: SUDBURY WORKS DEPARTMENT

---

Clean up and Restoration Carried out by:
[N] Controller [N] Owner [Y] Other: SUDBURY WORKS DEPARTMENT

% Cleaned up: 100.00 Estimated Cost: $
Were Directions or Approval Given Under EPA Part IX [N] Regulation 11/82 [N] | Emergency Generator No.

Waste Class: NOT APPLICABLE — Code..: 000
Hauler: SUDBURY WORKS DEPARTMENT — Code..: A000000
Disposal Site: SUDBURY WASTE DISPOSAL SITE — Code..: A999999

---

Environmental Impact: NOT ANTICIPATED | Nature of Impact: — Code..:

---

People/Business Damaged
(Other than to Owner/Controller)

Nature of Damage: — Code..:

---

# APPENDIX II

# ORIS CODING CATEGORIES

## OCCURRENCE TYPE CODES

---

**S** **Spill**

sub category:

- **L** Land
- **W** Water
- **A** Air

---

**N** **Notification**

sub category:

- **01** Condition of Operation
- **02** C of A Non-Compliance
- **03** Order Non-Compliance

---

**C** **Complaint**

sub category:

- **01** Odour
- **02** Noise
- **03** Dust/Particulate
- **04** Smoke
- **05** Litter/Waste
- **06** Water Pollution
- **07** Drinking Water
- **08** Vegetation Damage
- **99** Other

---

**O** **Other**

## MATERIAL CODES

**10 Series: OIL**

| | |
|---|---|
| 11 | Crude |
| 12 | Gasoline/Jet Fuel/Kerosene |
| 13 | Light Petroleum Oils: Motor, Diesel, Furnace, Mineral |
| 14 | Heavy Petroleum Oils: Bunker, Lubricating, Tar, Asphalt |
| 15 | Other Petroleum Oils |
| 16 | Non-Petroleum Oils |

**20 Series: CHEMICAL**

| | |
|---|---|
| 21 | Acids |
| 22 | Bases |
| 23 | Halogenated Solvents |
| 24 | Non-Halogenated Solvents |
| 25 | Pesticides |
| 26 | Polychlorinated Biphenyls (PCB's) |
| 27 | Other Organic |
| 28 | Other Inorganic |

**30 Series: GASES/PARTICULATE**

| | |
|---|---|
| 31 | Smoke |
| 32 | Dust/Particulate |
| 33 | Nitrous Oxides ($NO_x$) |
| 34 | $SO_2$ |
| 35 | Natural |
| 36 | Other Gases |

**40 Series: WASTES**

| | |
|---|---|
| 41 | Liquid Industrial |
| 42 | Hazardous |
| 43 | Non-hazardous Solid |
| 44 | Sewage |
| 45 | Agricultural |
| 46 | Other Wastes |

**90 Series: MISCELLANEOUS**

| | |
|---|---|
| 96 | Feed & Foodstuff |
| 97 | Not Applicable |
| 98 | Unknown |
| 99 | Other |

## ENVIRONMENTAL IMPACT - NATURE OF IMPACT CODES

| | | | |
|---|---|---|---|
| **01** | Human Health or Safety | **06** | Surface Water Pollution |
| **02** | Fish Kill | **07** | Soil Contamination |
| **03** | Other Kill or Injury | **99** | Other Damage |
| **04** | Vegetation Damage | | |
| **05** | Groundwater Pollution | | |

---

## Nature of Damage Codes

(Used to flag incidents of potential interest to
the Environmental Compensation Corporation)

| | | | |
|---|---|---|---|
| **01** | Personal Injury | **04** | Business/Wages Loss |
| **02** | Property Damage | | |
| **03** | Cleanup/Restore Cost | **99** | Other Damage |

## SECTOR CODE DESCRIPTION

| | | | |
|---|---|---|---|
| AG | Agriculture | - | includes co-ops, farms, ranches |
| CH | Chemical | - | chemical processing facilities that produce basic chemicals or feed stocks (incl. derivative products) and associated bulk transport vehicles |
| FD | Food Processing | - | canners, meat/fish packers (NOT distribution/retail) |
| FO | Forestry | - | forestry activities, operations vehicles |
| Government | - GM (Municipal)<br>- GF (Provincial)<br>- GF (Federal) | - | governmental and quasi-governmental bodies/organizations |
| GN | General Manufacturing | - | light manufacturing; metal plating, fabricating, textiles, etc. |
| ME | Metallurgy | - | steel and other metal manufacturing |
| MN | Mining | - | mining operations and associated equipment/vehicles |
| PE | Petroleum | - | includes bulk transport vehicles and service stations |
| PP | Pulp & Paper | - | processing facilities of pulp and paper industry |
| RE | Recreation | - | facilities which provide relaxation |
| RS | Residential/Private | - | house, cottages, vehicles, boats, aircraft |
| RT | Retail | - | diversified retail establishments |
| SI | Service Industry | - | dry cleaners, waste disposal, contractors, hotels, etc. including libraries and educational institutions. |
| TA | Transportation | - | carriers whose ONLY business is providing transportation services |
| OT | Other | - | sector not otherwise defined |
| UK | Unknown | - | sector not determined |

## SOURCE CODE DESCRIPTION

| | | | |
|---|---|---|---|
| **AC** | **Aircraft** | - | all vehicles that fly (except hovercraft) |
| **BC** | **Bulk Marine Carrier** | - | carriers of solid bulk cargo |
| **MT** | **Marine Tanker** | - | carriers of liquid/gaseous cargo |
| **MR** | **Marine Terminal** | - | commercial waterfront facility |
| **PC** | **Pleasure Craft** | - | privately owned recreational watercraft |
| **OW** | **Other Watercraft** | - | other commercial or gov't watercraft |
| **TR** | **Train/Railroad** | - | all vehicles that run exclusively on rails |
| **TT** | **Tank Truck** | - | road vehicles carrying bulk cargo in liquid, gaseous, powdered or other pumpable forms |
| **TP** | **Transport Truck** | - | general cargo transport road vehicle |
| **MV** | **Motor Vehicle** | - | road vehicle not otherwise defined |
| **PF** | **Production Field** | - | spills of raw materials at point of extraction |
| **PL** | **Pipeline** | - | bulk transportation lines (excluding "in-plant" piping) |
| **RF** | **Petroleum Refinery** | - | petroleum refining facilities |
| **SD** | **Storage Depot** | - | bulk storage facilities from which materials are distributed for sale |
| **SS** | **Service Station** | - | incl. airports, marinas and motor vehicle facilities |
| **OS** | **Other Storage Facility** | - | storage for on-site/private use (industrial plants, farms, residences) |
| **HP** | **Heat/Power Plant** | - | includes electric generating stations |
| **OP** | **(Other) Plant** | - | manufacturing/processing facilities (except refineries) |
| **ST** | **Sewage Treatment** | - | includes sewage treatment plants and lagoons |
| **SW** | **Sewer** | - | municipal/industrial wastewater collection systems |
| **TF** | **Transformer** | - | electrical transformers, capacitors etc. |
| **WD** | **Waste Disposal** | - | landfill sites, industrial waste treatment plant |
| **WS** | **Water Supply** | - | water treatment/distribution systems |
| **OT** | **Other** | - | source not otherwise defined |
| **UK** | **Unknown** | - | source not determined |

## CAUSE CODES

(answers the question, "what happened?")

| | | |
|---|---|---|
| 01 | **Collision (Watercraft)** | - accidents involving watercraft only |
| 02 | **Grounding (Watercraft)** | - watercraft running aground |
| 03 | **Sinking Watercraft** | - other than from collision or grounding |
| 04 | **Ship's Tank/Bilge Pumping** | - wastewater discharge from watercraft |
| 05 | **Derailment** | - accidents where railcars or engines leave the rails |
| 06 | **Crash (Aircraft)** | - applies only to aircraft accidents |
| 07 | **Overturn (Truck/Trailer)** | - trucks and tractor trailers only |
| 08 | **Other Transport Accident** | - road vehicle accidents other than above |
| 09 | **Overflow (Tanks, Lagoons)** | - overfilling tanks, containers and dikes |
| 10 | **Pipe and Hose Leak** | - from piping systems but not cooling systems |
| 11 | **Valve/Fitting Leak/Failure** | - leaks from specific parts of equipment containers or pipelines |
| 12 | **Bladder Leak** | - leaks from flexible storage containers |
| 13 | **Tank Leak (Underground)** | - buried storage tanks and associated piping |
| 14 | **Container Leak, Fuel Tanks, Barrels** | - includes bottles, boxes, vats & vehicle fuel/cargo tanks (other than cause 13 and 20) |
| 15 | **Discharge/Bypass to Watercourse** | - accidental or unusual variation of wastewater discharges to watercourses |
| 16 | **Well Blowout (Oil and Gas)** | - applies to oil or gas wells |
| 17 | **Process Upset** | - an usual variation in the regular discharge of a contaminant to air due to a fluctuation in the process |
| 18 | **Dyke failure (Lagoons, Ponds)** | - storage pond, lagoon wall failure |
| 19 | **Cooling System Leak** | - applies to transformers, capacitors, vehicle radiators, nuclear reactors, or other power plants |
| 20 | **Tank Leak (Surface)** | - storage tanks (fixed), tank-farm, heating systems (incl. delivery to disconnected filler-pipes) |
| 21 | **Start Ups/Shutdowns/Interruptions** | - operating condition change |
| 98 | **Unknown** | - cause of release not determined |
| 99 | **Other Discharges** | - to air/land/water, not otherwise defined |

## REASON CODES

(answers the question, "why it happened")

| | | |
|---|---|---|
| | **REASON FOR INCIDENT** | - the primary contributing factor to the cause |
| **01** | **Intentional/Planned** | - intentional or planned release |
| **02** | **Error** | - releases due to mistakes |
| **03** | **Vandalism** | - illegal/deliberate releases (incl. sabotage) |
| **04** | **Ice/Frost** | - releases resulting from freezing, frost heave, the weight of snow/ice, or falling ice |
| **05** | **Power Interruption** | - releases resulting from loss of power |
| **06** | **Fire/Explosion** | - releases resulting from fires/explosions (not releases that cause a fire or explosion) |
| **07** | **Storm/Flood** | - releases resulting from storm/flood/lighting (incl. compulsory wastewater bypasses due to high flows) |
| **08** | **Earthquake, slide** | - releases resulting from NATURAL earth movements |
| **09** | **Subsidence** | - release through settling of disturbed soils |
| **10** | **Equipment Failure** | - malfunctions in system components (e.g. brakes valves) |
| **11** | **Weld/Seam Failure** | - releases from point where material is joined to form the wall of a pipe/tank or other vessel |
| **12** | **Overstress/Overpressure** | - any form of overloading wherein the design strength of container was exceeded |
| **13** | **Corrosion** | - includes all forms of corrosion (internal/external) |
| **14** | **Material Failure** | - poor design or substandard materials |
| **15** | **Damage by Moving Equipment** | - containers damaged by vehicles |
| **16** | **Gasket/Joint** | - any point of connection (except reason 11) |
| **17** | **Negligence (Apparent)** | - release due to lack of diligence |
| **18** | **Adverse Road Condition** | - road faults, ice/snow, material on road |
| **19** | **Combustion Problems** | - stack emissions due to poor burning conditions |
| **97** | **Careless Application** | - misuse of pesticides, fertilizers, sludge |
| **98** | **Unknown** | - primary reason for release not determined |
| **99** | **Other** | - primary reason for release not otherwise defined |

## MINISTRY DISTRICT CODE TABLE

| MINISTRY REGION | DISTRICT CODE | DISTRICT |
|---|---|---|
| **Southwest** | LD | London |
| | OS | Owen Sound |
| | SR | Sarnia |
| | WD | Windsor |
| **West Central** | CA | Cambridge |
| | HA | Hamilton |
| | WL | Welland |
| **Central** | BA | Barrie |
| | MH | Muskoka/Haliburton |
| | OA | Oakville |
| | PT | Peterborough |
| | TE | Toronto East |
| | TW | Toronto West |
| | YD | York Durham |
| **Southeast** | BV | Belleville |
| | CW | Cornwall |
| | KG | Kingston |
| | OT | Ottawa |
| | PM | Pembroke |
| **Northeast** | NB | North Bay |
| | PA | Parry Sound |
| | SD | Sudbury |
| | SM | Sault Ste. Marie |
| | TI | Timmins |
| **Northwest** | KN | Kenora |
| | TB | Thunder Bay |

# APPENDIX III

# SPILLS BY CAUSE AND REASON

## CAUSE AND REASON CODES COMBINED

| REASON | CAUSE | | | | | | | | | | | | | | | | | | | | | | TOTALS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 98 | 99 | |
| 01 | | | | 3 | | | | | 3 | 4 | 2 | | | 18 | 21 | | 7 | | 2 | 1 | 27 | 1 | 38 | 127 |
| 02 | 2 | 3 | | 6 | 2 | 2 | 70 | 137 | 250 | 177 | 83 | | 11 | 235 | 31 | 1 | 21 | | 30 | 25 | 4 | 4 | 31 | 1125 |
| 03 | | | | | 1 | | | | 3 | 8 | 5 | | | 52 | 3 | | | | 9 | 16 | | 2 | 23 | 122 |
| 04 | | | | | | | | 1 | 11 | 14 | 7 | | | 4 | 1 | | 1 | | 1 | 4 | | 1 | 1 | 46 |
| 05 | | | | | | | | | 12 | | 4 | | | | 50 | 1 | 14 | | 4 | | 3 | | 1 | 89 |
| 06 | | | 1 | | | | | 4 | | 4 | 1 | | | 29 | | 1 | 13 | | 20 | 4 | | 8 | 36 | 121 |
| 07 | | | | | | | | | 19 | 1 | | | 1 | 9 | 20 | | | | 66 | 1 | | | 6 | 123 |
| 08 | | | | | | | | | | | | | | 1 | | | | 1 | | 1 | | | | 3 |
| 09 | | | | | | | | | | | | | | | | 1 | | 2 | | | | | 2 | 5 |
| 10 | | | 1 | 2 | 1 | 2 | 3 | 9 | 135 | 350 | 217 | | 14 | 168 | 123 | | 96 | | 158 | 41 | 13 | 4 | 9 | 1346 |
| 11 | | | | | | | | | | 19 | 6 | | | 29 | 2 | | 2 | 1 | 13 | 15 | | | | 87 |
| 12 | | | | | | | | | 20 | 124 | 21 | | 3 | 20 | 7 | | 4 | 3 | 33 | 3 | 2 | | | 240 |
| 13 | | | | | | | | 1 | | 65 | 10 | | 94 | 70 | 1 | | | 2 | 23 | 33 | | | 1 | 300 |
| 14 | | | | | 1 | | | | | 44 | 11 | | 6 | 26 | 1 | | 5 | 4 | 5 | 12 | | | 1 | 116 |
| 15 | | | | | 2 | | 11 | 13 | | 37 | 3 | 1 | 5 | 88 | | | | | 43 | 6 | | 1 | | 210 |
| 16 | | | | 1 | | | | | | 36 | 41 | | | 9 | 1 | | 1 | | 21 | 3 | | | | 113 |
| 17 | | | | 1 | | | 9 | | 19 | 18 | 1 | | 1 | 39 | 10 | | 2 | 1 | | 7 | 1 | 1 | 16 | 126 |
| 18 | | | | | | | | 21 | | | | | | 7 | | | | | | | | | 2 | 30 |
| 19 | | | | | | | | | | | | | | | 1 | | 21 | | | | 2 | | 2 | 26 |
| 97 | | | | | | | | | | | | | | | 1 | | | | | | | | 2 | 3 |
| 98 | | | 8 | 4 | 4 | | 9 | 14 | 38 | 51 | 16 | | 26 | 152 | 58 | | 19 | 4 | 19 | 26 | 1 | 285 | 7 | 741 |
| 99 | | | 1 | | | | 1 | 3 | 26 | 24 | 5 | | 2 | 27 | 15 | | 6 | | 16 | 8 | | 3 | 15 | 152 |
| TOTALS | 2 | 3 | 11 | 17 | 11 | 4 | 103 | 203 | 536 | 976 | 433 | 1 | 163 | 983 | 346 | 4 | 212 | 18 | 463 | 206 | 53 | 310 | 193 | 5251 |

| CAUSE | | REASON | |
|---|---|---|---|
| 01 | Collision (Watercraft) | 01 | Intentional/Planned |
| 02 | Grounding (Watercraft) | 02 | Error |
| 03 | Sinking Watercraft | 03 | Vandalism |
| 04 | Ship's Tank/Bilge Pumping | 04 | Ice/Frost |
| 05 | Derailment | 05 | Power Interruption |
| 06 | Crash (Aircraft) | 06 | Fire/Explosion |
| 07 | Overturn (Truck/Trailer) | 07 | Storm/Flood |
| 08 | Other Transport Accident | 08 | Earthquake, slide |
| 09 | Overflow (Tanks, Lagoons) | 09 | Subsidence |
| 10 | Pipe and Hose Leak | 10 | Equipment Failure |
| 11 | Valve/Fitting Leak/Failure | 11 | Weld/Seam Failure |
| 12 | Bladder Leak | 12 | Overstress/Overpressure |
| 13 | Tank Leak (Underground) | 13 | Corrosion |
| 14 | Container Leak, Fuel Tanks, Barrels | 14 | Material Failure |
| 15 | Discharge/Bypass to Watercourse | 15 | Damage by Moving Equipment |
| 16 | Well Blowout (Oil and Gas) | 16 | Gasket/Joint |
| 17 | Process Upset | 17 | Negligence (Apparent) |
| 18 | Dyke failure (Lagoons, Ponds) | 18 | Adverse Road Condition |
| 19 | Cooling System Leak | 19 | Combustion Problems |
| 20 | Tank Leak (Surface) | 97 | Careless Application |
| 21 | Start Ups/Shutdowns/Interruptions | 98 | Unknown |
| 98 | Unknown | 99 | Other |
| 99 | Other Discharges | | |

* See Appendix II for a complete Description of these Codes.